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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
VALENTIN, JUAN D	
ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 06/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/824,156	STIRTON, JAMES BROC	
	Examiner	Art Unit	
	Juan D Valentin II	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Declaration

1. The declaration submitted by Applicant on 03/26/2003 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-37 rejected under 35 U.S.C. 103(a) as being unpatentable over Campion et al. (USPN '119, hereinafter Campion) in view of Kleinknecht (USPN '123).

Claim 1

Campion discloses a method comprising of providing a semiconductor substrate and forming a first plurality of implant regions (col. 11, lines 10-13) in the substrate. Campion further discloses illuminating said first plurality of implant regions with a light source in a scatterometry tool where said scatterometry tool generates a trace (feature) profile corresponding to an implant profile of said implant regions (col. 6, lines 48-64, col. 8, lines 44-48). It is the position of the Office that the intensity characteristics generated by Campion are equivalent to the implant profile, and the trace profile as claimed by the applicant is equivalent to the complete

profile determined by Campion by comparison of known sample profiles with the generated intensity characteristic of the sample being measured.

Campion substantially teaches the claimed invention except that it fails to show illuminating a first plurality of implant regions with a light source. Kleinknecht shows that it is known to provide illumination of first plurality of implant regions with a light source (col. 3, lines 5-12) for semiconductor manufacturing. It would have been obvious to someone of ordinary skill in the art to combine the device of Campion with the illumination of a plurality of implant regions of Kleinknecht for the purposes of providing a means to measure the concentration of carriers near the surface of a semiconductor substrate (col. 4, lines 32-35).

Claims 2

Campion in view of Kleinknecht discloses a method further comprising generating an additional trace profile for an additional plurality of implant regions formed in said substrate or additional substrates. The said additional plurality of implant regions having an implant profile different from said first plurality of implant regions and further creating a library (database) comprised of a plurality of calculated trace profiles of implant regions having varying implant profiles (Campion, col. 11, lines 41-63). It would have been obvious to someone of ordinary skill in the art that in order to provide one or more profile characteristics to a processor, one or more profile characteristics must be generated.

Claim 3

Campion in view of Kleinknecht discloses creating a library comprised of a plurality of calculated trace profiles of implant regions having varying implant profiles (col. 11, lines 41-63). It is obvious to someone of ordinary skill in the art that if one or more profile characteristics are

provided to a processor, then some form of library (database) must be created within the processor in order for the processor to compare the generated profile trace to known profile traces (col. 8, line 80-col. 9, line 25). Therefore, it is the position of the Office that the reference of Campion in view of Kleinknecht reads on the claimed limitations.

Claim 4

Campion substantially teaches the claimed invention except that it fails to show a method wherein the first plurality of implant regions in the substrate comprises forming a first plurality of implant regions to thereby define a grating structure in said substrate. Kleinknecht shows that it is known to provide a first plurality of implant regions to thereby define a grating structure in said substrate (abstract) for semiconductor manufacturing. It would have been obvious to someone of ordinary skill in the art to combine the device of Campion with t plurality of implant regions to thereby define a grating structure of Kleinknecht for the purposes of providing a means to measure the concentration of carriers in a diffraction grating structure in a semiconductor substrate (abstract).

Claim 5

Campion in view of Kleinknecht further discloses a method wherein said first plurality of implant regions are comprised of N-type dopant material or P-type dopant material (Campion, col. 1, lines 45-49). It is obvious and well known to someone of ordinary skill in the art that semiconductor substrates with implant regions or features are going to be doped with either a P-type or N-type dopant. Applicant is appreciated that the reference of Singh reads upon the claimed limitations.

Claim 6

Campion in view of Kleinknecht further discloses wherein first plurality of implant regions are illuminated using at least one of a multiple wavelength light source and a single wavelength light source (Campion, col. 4, lines 53-67).

Claim 7

Campion in view of Kleinknecht further discloses a method wherein said implant profile is comprised of at least one of a width, a depth, a dopant concentration level, and a dopant concentration profile of said implant regions (col. 8, lines 44-63).

Claim 8

Campion discloses a method of measuring profiles of implant regions formed in a semiconductor substrate comprising forming a plurality of implant regions in a semiconductor substrate and illuminating said plurality of implant regions (col. 11, lines 10-13). Campion further discloses measuring light reflected off the substrate to generate a profile trace for said implant regions and then comparing the generated profile trace to a target profile trace (col. 6, lines 48-64, col. 8, lines 44-48). Campion further discloses modifying based upon a deviation between the generated profile trace and the target profile trace at least one parameter of an ion implantation process used to form implant regions on subsequently processed substrates (col. 11, lines 41-63). It is the position of the Office that the intensity characteristics generated by Campion are equivalent to the implant profile, and the trace profile as claimed by the applicant is equivalent to the complete profile determined by Campion by comparison of known sample profiles with the generated intensity characteristic of the sample being measured.

Campion substantially teaches the claimed invention except that it fails to show illuminating a first plurality of implant regions with a light source. Kleinknecht shows that it is known to provide illumination of first plurality of implant regions with a light source (col. 3, lines 5-12) for semiconductor manufacturing. It would have been obvious to someone of ordinary skill in the art to combine the device of Campion with the illumination of a plurality of implant regions of Kleinknecht for the purposes of providing a means to measure the concentration of carriers near the surface of a semiconductor substrate (col. 4, lines 32-35).

Claim 9

Campion in view of Kleinknecht further disclose a method comprising correlating the generated profile trace to a profile trace from a library where the profile trace from the library has an associated implant region profile (Campion, col. 11, lines 41-63). It is obvious to someone of ordinary skill in the art that the profile characteristics stored by Campion are associated with an implant region profile.

Claim 10

Campion in view of Kleinknecht further discloses modifying based upon a deviation between the generated profile trace and the profile trace from the library, at least one parameter of an ion implantation process used to form implant regions on subsequently processed substrates (Campion, col. 11, lines 41-63).

Claims 11, 19, 27, & 34

Campion in view of Kleinknecht further discloses a method wherein measuring the reflected light comprises measuring the intensity of the reflected light (Campion, abstract).

Claims12 & 20

Campion in view of Kleinknecht further discloses a method comprising providing a library of calculated profiles traces, each of which correspond to a unique profile of an implanted region (Campion, col. 11, lines 41-63). It is obvious to someone of ordinary skill in the art that the storage of profile characteristics of Campion is the equivalent of providing a library and Applicant will be appreciated that the profile characteristics of Campion are of unique profiles of implanted regions.

Regarding the further limitation in claim 20, it is the position of the Office that even though the reference of Campion in view of Kleinknecht does not specifically disclose providing a library of profile traces **in a library**, it does outline the importance of storing profile characteristics in a processor (database) (col. 11, line 41-63). In light of the applicants disclosure, there is no critically distinguishing providing a **library in a library** feature in the applicants disclosure that exemplifies novelty over prior art disclosure. Therefore producing the same results as the applicants limitation, therefore the reference of Campion in view of Kleinknecht reads on applicants claimed limitation.

Claims 13, 14, 21, 22, 28, 29, 36, & 37

Campion in view of Kleinknecht further discloses a method wherein measuring light reflected off the substrate to generate a profile trace for said implant regions is performed after the implanted regions being subjected to an annealing process or a diffusion process (Campion, col. 11, lines 3-40).

Campion in view Kleinkecht discloses the claimed invention except for measuring light reflected off the substrate to generate a profile trace for said implant regions is performed after

the implanted regions being subjected to an annealing process. It would have been obvious to one having ordinary skill in the art at the time of the claimed invention was made to perform the optical measuring process prior to annealing since it is well known to inspect manufactured devices several times **throughout** the entire manufacturing process.

Claim 15, 23, & 30

Campion in view Kleinkecht discloses a method wherein modifying at least one parameter of an ion implant process comprises modifying at least one of an ion implant energy, an implant angle, a dopant material, and a dopant material concentration (col. 1, lines 45-54). It is obvious and well known to someone of ordinary skill in the art that during the fabrication process of semiconductor devices, certain process parameters such as implant angles, dopant material and dopant material concentration among others are variable in order to quickly optimize production of the semiconductor devices. Therefore, Applicant will be appreciated that the reference of Campion in view Kleinkecht reads on the applicants claimed limitations.

Claim 16

Campion discloses a method of measuring profiles of implant regions formed in a semiconductor substrate comprising forming a plurality of implant regions in a semiconductor substrate and illuminating said plurality of implant regions (col. 11, lines 10-13). Campion further discloses measuring light reflected off the substrate to generate a profile trace for said implant regions and then comparing the generated profile trace to a target profile trace (col. 6, lines 48-64, col. 8, lines 44-48). Campion discloses comparing the generated profile trace to a calculated profile trace in a library where the calculated profile trace has an associated implant region profile (col. 11, lines 41-63). Singh further discloses modifying based upon said

comparison of the generated profile trace and the calculated profile trace, at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates (col. 11, lines 41-63). It is the position of the Office that the intensity characteristics generated by Campion are equivalent to the implant profile, and the trace profile as claimed by the applicant is equivalent to the complete profile determined by Campion by comparison of known sample profiles with the generated intensity characteristic of the sample being measured.

Campion substantially teaches the claimed invention except that it fails to show illuminating a first plurality of implant regions with a light source. Kleinknecht shows that it is known to provide illumination of first plurality of implant regions with a light source (col. 3, lines 5-12) for semiconductor manufacturing. It would have been obvious to someone of ordinary skill in the art to combine the device of Campion with the illumination of a plurality of implant regions of Kleinknecht for the purposes of providing a means to measure the concentration of carriers near the surface of a semiconductor substrate (col. 4, lines 32-35).

Claim 17

Campion in view Kleinkecht discloses a method further comprising the generated profile trace to a target profile trace from said library (col. 11, lines 41-63).

Claim 18 & 26

Campion in view Kleinkecht further discloses a method of modifying based upon a comparison of the generated profile trace and the target profile trace, at least one parameter of an ion implantation process used to form implant regions on subsequently processed substrates (col. 11, lines 41-63).

Claim 24

Campion discloses a method of measuring profiles of implant regions formed in a semiconductor substrate comprising forming a plurality of implant regions in a semiconductor substrate and illuminating said plurality of implant regions (col. 11, lines 10-13). Campion further discloses measuring light reflected off the substrate to generate a profile trace for said implant regions and then comparing the generated profile trace to a target profile trace (col. 6, lines 48-64, col. 8, lines 44-48). Campion in view of Kleinknecht further discloses providing a library comprised of a plurality of calculated profiles traces, each of which correspond to a unique profile of an implanted region (Campion, col. 11, lines 41-63). It is obvious to someone of ordinary skill in the art that the storage of profile characteristics of Campion is the equivalent of providing a library and Applicant will be appreciated that the profile characteristics of Campion are of unique profiles of implanted regions. Campion discloses comparing the generated profile trace to a calculated profile trace in a library where the calculated profile trace has an associated implant region profile (col. 11, lines 41-63). Campion further discloses modifying based upon said comparison of the generated profile trace and the calculated profile trace, at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates (col. 11, lines 41-63). It is the position of the Office that the intensity characteristics generated by Campion are equivalent to the implant profile, and the trace profile as claimed by the applicant is equivalent to the complete profile determined by Campion by comparison of known sample profiles with the generated intensity characteristic of the sample being measured.

Campion substantially teaches the claimed invention except that it fails to show illuminating a first plurality of implant regions with a light source. Kleinknecht shows that it is known to provide illumination of first plurality of implant regions with a light source (col. 3, lines 5-12) for semiconductor manufacturing. It would have been obvious to someone of ordinary skill in the art to combine the device of Campion with the illumination of a plurality of implant regions of Kleinknecht for the purposes of providing a means to measure the concentration of carriers near the surface of a semiconductor substrate (col. 4, lines 32-35).

Claim 25

Campion in view Kleinkecht further discloses a method comprising the generated profile trace to a target profile trace (col. 11, lines 41-63).

Claim 31

Campion discloses a method of measuring profiles of implant regions formed in a semiconductor substrate comprising forming a plurality of implant regions in a semiconductor substrate and illuminating said plurality of implant regions (col. 11, lines 10-13). Campion further discloses measuring light reflected off the substrate to generate a profile trace for said implant regions and then comparing the generated profile trace to a target profile trace (col. 6, lines 48-64, col. 8, lines 44-48). Campion further discloses modifying based upon said comparison of the generated profile trace and the calculated profile trace, at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates (col. 11, lines 41-63). Campion discloses at least one parameter comprises at least one of an ion implant energy, an implant angle, a dopant material, and a dopant material concentration (col. 8, lines 44-63). It is obvious and well known to someone of ordinary skill in the art that during the

fabrication process of semiconductor devices, certain process parameters such as implant angles, dopant material and dopant material concentration among others are variable in order to quickly optimize production of the semiconductor devices. Therefore, applicant will be appreciated that the reference of Singh reads on the applicants claimed limitations. It is the position of the Office that the intensity characteristics generated by Campion are equivalent to the implant profile, and the trace profile as claimed by the applicant is equivalent to the complete profile determined by Campion by comparison of known sample profiles with the generated intensity characteristic of the sample being measured.

Campion substantially teaches the claimed invention except that it fails to show illuminating a first plurality of implant regions with a light source. Kleinknecht shows that it is known to provide illumination of first plurality of implant regions with a light source (col. 3, lines 5-12) for semiconductor manufacturing. It would have been obvious to someone of ordinary skill in the art to combine the device of Campion with the illumination of a plurality of implant regions of Kleinknecht for the purposes of providing a means to measure the concentration of carriers near the surface of a semiconductor substrate (col. 4, lines 32-35).

Claim 32

Campion in view Kleinkecht further discloses a method comprising comparing the generated profile trace to a calculated profile trace in a library where the calculated profile trace has an associated implant region profile (Campion, col. 11, lines 41-63). It is obvious to someone of ordinary skill in the art that the profile characteristics stored by Campion are associated with an implant region profile.

It is obvious to someone of ordinary skill in the art that if one or more profile characteristics are provided to a processor, then some form of library (database) must be created within the processor in order for the processor to compare the generated profile trace to known profile traces (col. 8, line 80-col. 9, line 25). Therefore, it is the position of the Office that the reference of Campion in view of Kleinknecht reads on the claimed limitations.

Claim 33

Campion in view Kleinkecht further discloses modifying based upon said comparison of the generated profile trace and the calculated profile trace, at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates (col. 11, lines 41-63).

Claim 35

Campion in view Kleinkecht further discloses a method comprising providing a library of historical profile traces, each of which correspond to a unique profile of an implanted region (col. 11, lines 41-63). It is the position of the Office that adding the further limitation of **historical** profile traces does not add patentable weight, therefore, the reference of Campion in view Kleinkecht reads on the claimed limitations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan D Valentin II whose telephone number is (703) 605-4226. The examiner can normally be reached on M-Th., Every other Fr..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (703) 308-4881. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308- 0955.

Juan D Valentin II
Examiner 2877
JDV
June 3, 2003

Michael P. Stafira
Primary Patent Examiner
...nology Center 2800